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Renuga Gopal

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EXAMINER

DANIELS, MATTHEW J

ART UNIT

PAPER NUMBER

1732

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DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/743,562

Applicant(s)

GOPAL ET AL.

Examiner

Matthew J. Daniels

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1732

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 April 2007 and 02 October 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 7-20 is/are pending in the application.
- 4a) Of the above claim(s) 15 and 16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-5, 7-14 and 17-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 10/2/06
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

1. This application has been transferred to Matthew J. Daniels.

Election/Restrictions

2. Applicant's election of Group I, Claims 1-5, 7-14, and 17-20 in the reply filed on 12 April 2007 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Prior art rejections should ordinarily be confined strictly to the best available art. Exceptions may properly be made, for example, where the most pertinent reference seems likely to be antedated by a 37 CFR 1.131 affidavit or declaration. Such rejections should be backed up by the best other art rejections available. See MPEP 706.02(I). In this case, WO 02/30647 appears to be the best available art, but also seems likely to be antedated by a 37 CFR 1.131 declaration. Therefore, the rejection over the WO 02/30647 reference will be backed up by the best other art rejection available.

4. **Claims 1-5, 7, 8, 12-14, 17, and 18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Bachmann (WO 02/30647 with the translation of FR 2815352 used as an English-language equivalent. Citations are from the translation of FR 2815352) in view of Sharrow (USPN 3164888). **As to Claim 1**, Bachmann teaches a method of forming a fiber reinforced composite, comprising:

Placing a composite of straight fiber and resin in an elongate tunnel of a shrinkable die formed of a heat sensitive material that shrinks in response to heat (Translation, pages 3 and 4);

Shrinking the die by heating it to reduce the cross sectional area along a longitudinal extent of the tunnel so that the fiber and resin assume the predefined cross sectional shape (page 7, middle of page, Fig. 17);

Curing the composite of fiber and resin (page 10, top half);

Bachmann is silent to the compressing the composite of fiber and resin by shrinking the die and wherein the tunnel retains the predefined shape and shrinks uniformly in cross section area as it is shrunk. However, Sharrow teaches compressing (4:1-15) and retention of the predefined (round) shape while shrinking in a substantially uniform manner by approximately 30% (3:70-75).

It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Sharrow into that of Bachmann because (a) Bachmann suggests a thermoshrinkable sheath (page 18, bottom half), which Sharrow provides, and (b) a compressed composite would have improved strength by forcing the resin into the interstices between the fibers.

As to **Claim 2**, Sharrow's heat-shrinkable tubing will compress the fibers into a pre-determined shape (round, Fig. 1). As to **Claim 3**, Bachmann removes the sheath (page 5, top half), and in view of the curing of the thermosetting resin, retention of its shape would be implicit in Bachmann's method. As to **Claims 4 and 5**, Sharrow bends lengthwise and shrinks to shape the material (Fig. 2, item 10), and Bachmann provides curing. It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to perform the curing as the last step in order to avoid breaking the composite. It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate this aspect of Sharrow's invention into that of Bachmann to produce the various shapes suggested by Bachmann (such as for dental elements and underwires). As to **Claims 7 and 8**, Sharrow teaches that the fiber comprises a plurality of elongated strands (Fig. 1, items, 4, 1, 2, and 3), each being longer than the tunnel (Fig. 1). One of ordinary skill would have found it obvious to pull the fibers through the tunnel in order to move the heat shrinkable tube to the desired position. Additionally, Bachmann teaches that a puller string (40) is used, which would pull the strands into and through the tunnel of the die. As to **Claim 12**, Bachmann provides the resin while performing the pulling (Fig. 17), which is interpreted to be adding additional resin in the tunnel of the die. Alternatively, reversal of the order of prior art process steps is generally considered to be prima facie obvious. *Ex parte Rubin*, 128 USPQ 440 (Bd. App. 1959) (Prior art reference disclosing a process of making a laminated sheet wherein a base sheet is first coated with a metallic film and thereafter impregnated with a thermosetting material was held to render prima facie obvious claims directed to a process of making a laminated sheet by reversing the order of the prior art process steps.) In this case, *Rubin* is particularly relevant to this case

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because it deals with rearrangement of the order of a step of impregnating with a thermosetting material, as disclosed by Bachmann. **As to Claim 13**, although silent to the tunnel being vertically disposed, it is submitted that the combination of Bachmann with Sharrow would provide the same process and result without regard to the orientation of the die with respect to vertical. **As to Claim 14**, the die of Sharrow is bent (Fig. 2, item 10) and forms an arched wire which could be used, and therefore would be suitable, as a wire in an orthodontic treatment. Bachmann explicitly suggests dental (orthodontic) elements (page 5). **As to Claims 17 and 18**, the composite formed by the method of Sharrow and Bachmann would have a substantially circular cross-sectional shape, and because the wires of Sharrow are conductors (2:2)(and therefore metallic), it is submitted that they would be substantially the same as orthodontic wires. Bachmann explicitly suggests dental (orthodontic) elements (page 5).

5. **Claims 9-11** are rejected under 35 U.S.C. 103(a) as being unpatentable over Bachmann (WO 02/30647 with the translation of FR 2815352 used as an English-language equivalent. Citations are from the translation of FR 2815352) in view of Sharrow (USPN 3164888), and further in view of Gray (USPN 5718251). Bachmann and Sharrow teach the subject matter of Claim 8 above under 35 USC 103(a). **As to Claim 9**, Bachmann and Sharrow do not explicitly teach pulling both ends to straighten the fiber in the die. However, Bachmann and Sharrow each suggest placing the fibers in a thermoshrinkable material. Gray teaches that in placing a material in a heat shrinkable sheath, it is desirable to pull the fibers (Example 9, 10:65-11:22). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Gray into that of Bachmann in order to provide a fixed and desired

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orientation of the fibers within the sheath. **As to Claims 10 and 11**, Bachmann teaches the impregnation of the fibers with resin and placement in the sheath (Fig. 17), which is interpreted to be adding it in the tunnel of the die. Bachmann appears to be silent to preimpregnation. However, reversal of the order of prior art process steps is generally considered to be *prima facie* obvious. *Ex parte Rubin*, 128 USPQ 440 (Bd. App. 1959) (Prior art reference disclosing a process of making a laminated sheet wherein a base sheet is first coated with a metallic film and thereafter impregnated with a thermosetting material was held to render *prima facie* obvious claims directed to a process of making a laminated sheet by reversing the order of the prior art process steps.) In this case, *Rubin* is particularly relevant to this case because it deals with rearrangement of the order of a step of impregnating with a thermosetting material, as disclosed by as disclosed by Bachmann. It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to reverse the order of process steps in order to distribute the resin among the fibers.

6. **Claims 19 and 20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Bachmann (WO 02/30647 with the translation of FR 2815352 used as an English-language equivalent. Citations are from the translation of FR 2815352) in view of Sharrow (USPN 3164888), and Gray (USPN 5718251).

As to Claim 19, Bachmann teaches a method of forming a fiber reinforced composite wire comprising:

Placing a plurality of fiber strands and resin in a tunnel of a shrinkable die formed of a heat sensitive material that shrinks in response to heat (page 4, middle, Fig. 17), the tunnel

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extending longitudinally along an axis and having a predefined transversal cross-sectional shape (round);

Pulling the fiber strands to extend the fiber strands along the tunnel generally parallel to the axis (Fig. 17, pulling string 40);

Shrinking the die by heating it to reduce the cross sectional area along a longitudinal extent of the tunnel so that the fiber and resin assume the predefined cross sectional shape (page 7, middle of page, Fig. 17);

Curing the fiber and resin to form a reinforced composite wire (page 10, top half)

Bachmann is silent to (a) pulling opposite ends of the fiber strands, and (b) the compressing the composite of fiber and resin by shrinking the die and wherein the tunnel retains the predefined shape and shrinks uniformly in cross section area as it is shrunk, distributing the fiber substantially evenly within the tunnel. However, these aspects of the invention would have been prima facie obvious for the following reasons:

(a) Gray teaches that in placing a material in a heat shrinkable sheath, it is desirable to pull both ends (Example 9, 10:65-11:22).

(b) Sharrow teaches compressing (4:1-15) and retention of the predefined (round) shape while shrinking in a substantially uniform manner by approximately 30% (3:70-75). Because the heat shrinkable tube of Sharrow compresses the fibers, it would be implicit that the fiber would be compressed into a bundle and distributed evenly within the bundle.

It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the methods of Gray and Sharrow into that of Bachmann because (a) doing so would provide a fixed and desired orientation of the fibers within the sheath, and (b)

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Bachmann suggests a thermoshrinkable sheath (page 18, bottom half), which Sharrow provides, and, a compressed composite would have improved strength by forcing the resin into the interstices between the fibers.

7. **Claims 1-5, 7-8, 12-14, 17, and 18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharrow (USPN 3164888) in view of Moraschetti (USPN 4076377). **As to Claim 1**, Sharrow teaches:

placing straight fiber (Fig. 1) and in an elongate tunnel of a shrinkable die formed of a heat-sensitive material that shrinks in response to heat (Fig. 1, items 5-10, 2:35-70), the tunnel having a predefined transversal cross-sectional shape (round);

shrinking the die by heating it to reduce the cross section of the tunnel in the longitudinal direction so as to compress the fibers to assume the predefined shape (2:35-70 and 4:1-8);

wherein the tunnel retains the predefined shape and shrinks uniformly in cross-sectional area when shrunk (implicit in that the tunnel is round before and after shrinking, Figs. 1-3).

Sharrow is silent to the placing of a fiber composite and curing of the composite.

However, Moraschetti teaches placing fibers in a tube with a curable agent (5:10-22). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Moraschetti into that of Sharrow because (a) Sharrow would find it desirable to avoid patching and taping of the coil bends due to abrasion (1:67-70) and the curable material of Moraschetti would provide enhanced protection to the embedded material, further improving the abrasion resistance, and (b) Sharrow suggests immobilizing the fibers by embedding the coils in a shellac (3:55-60), and Moraschetti's curable material would function as

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an encapsulant in the same manner as the shellac of Sharrow. **As to Claim 2**, Sharrow's heat-shrinkable tubing will compress the fibers into a pre-determined shape (round, Fig. 1). In combination with Moraschetti's curable material, all limitations are disclosed by the combination. **As to Claim 3**, the composite formed by the combined method of Sharrow and Moraschetti would retain its shape when separated from the die in view of the thermosetting resin provided by Moraschetti. **As to Claims 4 and 5**, Sharrow bends lengthwise and shrinks to shape the material (Fig. 2, item 10), and Moraschetti provides that the curing is performed after bending (Fig. 1). **As to Claims 7 and 8**, Sharrow teaches that the fiber comprises a plurality of elongated strands (Fig. 1, items, 4, 1, 2, and 3), each being longer than the tunnel (Fig. 1). One of ordinary skill would have found it obvious to pull the fibers through the tunnel in order to move the heat shrinkable tube to the desired position. **As to Claim 12**, Moraschetti provides the claimed resin after the fibers are placed in the mold (6:3-13). **As to Claim 13**, although silent to the tunnel being vertically disposed, it is submitted that the combination of Moraschetti with Sharrow would provide the same process and result without regard to the orientation of the die with respect to vertical. **As to Claim 14**, the die of Sharrow is bent (Fig. 2, item 10) and forms an arched wire which could be used, and therefore would be suitable, as a wire in an orthodontic treatment. **As to Claims 17 and 18**, the composite formed by the method of Sharrow and Moraschetti would have a substantially circular cross-sectional shape, and because the wires of Sharrow are conductors (2:2)(and therefore metallic), it is submitted that they would be substantially the same as orthodontic wires.

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8. **Claims 9-11** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharrow (USPN 3164888) in view of Moraschetti (USPN 4076377), and further in view of Gray (USPN 5718251). Sharrow and Moraschetti teach the subject matter of Claim 8 above under 35 USC 103(a). **As to Claim 9**, Sharrow and Moraschetti do not explicitly teach pulling both ends to straighten the fiber in the die. However, Sharrow suggests placing the fibers in a thermoshrinkable material. Gray teaches that in placing a material in a heat shrinkable sheath, it is desirable to pull the fibers (Example 9, 10:65-11:22). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Gray into that of Sharrow in order to provide a fixed and desired orientation of the fibers within the sheath. **As to Claims 10 and 11**, Moraschetti teaches adding resin in the tunnel so as to fill the tunnel (Figures). However, Sharrow and Moraschetti are silent to the pre-impregnation of the fibers with resin. However, it is submitted that this limitation is drawn to a difference in the order of process steps disclosed by the prior art. However, reversal of the order of prior art process steps is generally considered to be prima facie obvious. *Ex parte Rubin*, 128 USPQ 440 (Bd. App. 1959) (Prior art reference disclosing a process of making a laminated sheet wherein a base sheet is first coated with a metallic film and thereafter impregnated with a thermosetting material was held to render prima facie obvious claims directed to a process of making a laminated sheet by reversing the order of the prior art process steps.) In this case, *Rubin* is particularly relevant to this case because it deals with rearrangement of the order of a step of impregnating with a thermosetting material, as disclosed by Moraschetti.

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9. **Claims 19 and 20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharrow (USPN 3164888) in view of Moraschetti (USPN 4076377), and Gray (USPN 5718251). **As to Claim 19**, Sharrow teaches a method of forming a fiber reinforced composite wire (Fig. 2), comprising:

Placing a plurality of elongate strands (Fig. 1, items 5-10) in a tunnel of a shrinkable die formed of a heat-sensitive material that shrinks in response to heat (4:1-15), the tunnel extending longitudinally along an axis and having a predefined transversal cross sectional shape (round);

Extending the fiber strands along the tunnel generally parallel to its axis (Fig. 1);

Shrinking the die by heating the die to compress the fiber strands, compressing the strands to assume the predefined cross-sectional shape (4:1-15); and

Wherein the tunnel retains the predefined shape and shrinks uniformly in cross-sectional area as it is shrunk (3:73-75 and 4:1-15).

Sharrow is silent to: (a) the composite wire having a resin which is later cured, and (b) pulling opposite ends of the fiber strands to extend them along the tunnel.

However, these aspects of the invention would have been prima facie obvious for the following reasons:

(a) Moraschetti teaches placing fibers in a tube with a curable agent (5:10-22).

(b) Gray teaches that it is known to place a heat shrinkable tube over fiber and pull both ends in order to orient the fiber in the tube.

It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Moraschetti and Gray into that of Sharrow because

(a1) Sharrow would find it desirable to avoid patching and taping of the coil bends due to

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abrasion (1:67-70) and the curable material of Moraschetti would provide enhanced protection to the embedded material, further improving the abrasion resistance, and (a2) Sharrow suggests immobilizing the fibers by embedding the coils in a shellac (3:55-60), and Moraschetti's curable material would function as an encapsulant in the same manner as the shellac of Sharrow, and (b) the fixture of Gray would provide fibers in a fixed and desired orientation within the sheath.

As to Claim 20, in the method of Sharrow, the die is bendable along an axis, and is bent in order to shape the fiber (Fig. 2, item 10). In the combined method, Moraschetti provides the resin in the die.

Response to Arguments

10. Applicant's arguments filed 2 October 2006 have been fully considered but they are not persuasive or are moot in view of the new grounds of rejection above. The arguments assert that there is no motivation to combine the references, and that there is no disclosure of a "pre-defined transversal cross sectional shape, which is retained when the die is shrunk." (page 7).

11. However, these arguments are moot in view of the new rejections above, which each show a predefined round shape being used and maintained upon shrinking. Note that the translation of FR 2815352 does not appear to include the figures submitted on 3 November 2004 does not include the figures, which are found in the WO 02/30647 reference.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Daniels whose telephone number is (571) 272-2450. The examiner can normally be reached on Monday - Friday, 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on (571) 272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Matthew J. Daniels